particular providing them with better adhesion and better durability, particularly on substrates exhibiting characteristics of surface roughness of porosity.

Please replace the paragraph at page 3, lines 5-34, with the following text:

A photocatalytic coating makes it possible to confer highly advantageous novel functionalities on these known substrates. Thus, the felts/mats of mineral wool mainly used in insulation can be treated only superficially, only on one of their faces, for example, or on each of their faces, and can acquire a dirt-repellent/odour-controlling function on at least one of their treated faces (the visible face and /or the hidden face) in false ceiling structures of buildings, in antinoise screens alongside roads or railways, and the like, the condition laid down being that the photocatalytic coating is accessible to a natural or artificial light source. Still in the field of insulation, the "moulds" can also be treated on the inside and/or outside or over their entire thickness, for example, in order to confer on them a dirt-repellent and/or bactericidal or fungicidal function. In the form of mats or of moulds, the substrates treated according to the invention can advantageously be positioned around outlet conduits in any ventilation or air-conditioning system but also by being positioned inside these conduits, these devices being veritable breeding grounds for bacteria, the condition being that it is necessary to provide means for the photocatalytic coating to be exposed to sufficient ultraviolet radiation to be effective: on a visible external face, natural illumination may be sufficient. If not, the substrates have to be combined with artificial illuminating means of the halogen lamp or fluorescent tube type.

Please replace the paragraph at page 4, lines 12-20, with the following text:

The term "filter" covers two notions within the meaning of the invention, both the

notion of true filtration, where particles are separated mechanically from the gas carrying them, and the notion of diffuser, in particular of odour-controlling diffuser, where the gas to be treated is not necessarily forced to pass through the photocatalytic substrate, where it can in particular simply be brought into contact with the latter, without retaining the suspended particles.

Please replace the paragraph at page 4, lines 30-39, with the following text:

The filters, surface-treated or treated throughout their thickness, can become much more effective and much more durable; this is because the treatment according to the invention gives them the ability not only to remove microorganisms but also to decompose organic residues of fatty type, for example, particles which gradually block the filter. With the invention, these filters therefore have a longer lifetime. In addition, they have an odour-controlling function.

Please replace the paragraph at page 5, lines 10-17, with the following text:

The advantage of treating all these fibrous substrates according to the present invention has been seen. However, to furnish term with a photocatalytic coating was not, initially, very easy. This was because the question arose of the method of deposition of the coating on a substrate which is generally non-smooth, non-flat and of rough and porous type, as well as the question of the durability of this coating.

Please replace three paragraphs at page 5, line 29, through page 6, line 16, with the following text:

According to a first embodiment of the present invention, the titanium oxide is already

at least partially precrystallized in anatase form when it is incorporated in the coating, before being deposited on the substrate. It can be introduced into the coating in the form of crystalline particles in colloidal suspension or in the form of a dry power composed of particles which are optionally more or less agglomerated with one another. This alternative form exhibits the advantage of not imposing a high specific heat treatment on the coating/substrate on which it is deposited ($TiO_2$ crystallizes in the anatase form generally in the vicinity of 400°C).

According to a second embodiment of the present invention which can be combined with the first embodiment, the titanium oxide originates from the thermal decomposition of precursors, in particular of the organometallic or metal halide type, within the coating. The anatase crystallized $TiO_2$ can thus be manufactured "in situ" in the coating, once applied to the substrate, by providing for an ad hoc heat treatment, which must, however, be compatible with the chosen substrate and the chosen adhesion promoter.

The adhesion promoter can be single- or multicomponent, and its component or components can be organic, inorganic or organic/inorganic "hybrids".

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Please replace two paragraphs at page 6, line 26, through page 7, line 15, with the following text:

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The adhesion promoter can also comprise one or more polymers of organic type. In fact, two scenarios exist: standard organic polymers, for example of the acrylic or phenol-formaldehyde type, or the like, can be chose. In this case, there is a risk of this component being gradually decomposed by photocatalysis by the $TiO_2$, at least in the surface regions of the substrate liable to be exposed to ultraviolet radiation. However, the process can in fact prove to be advantageous in some applications, by thus gradually "releasing" active $TiO_2$.

However, it may be preferable to avoid or slow down as far as possible this decomposition by choosing appropriate polymers, generally fluorinated polymers, which are highly resistant to photocatalytic attacks, for example of the fluorinatd acrylic polymer type, of the polytetrafluoroethylene (PTFE), poly (vinylidene fluoride) (PVDF) or tetrafluoroethylene-ethylene copolymer (ETFE) type, and the like.

One alternative is retaining an adhesion promoter based on organic polymer(s) and thwarting their decomposition by appropriate additives, in particular belonging to the family of the antioxidants (such as the product sold under the name Irganox by the company Ciba) and /or of the ultraviolet absorbers (such as the product sold under the name Tinuvin by the same company) and/or of stabilizers in the form of sterically hindered amines known under the term "hindered amine light stabilizers" or "HALS".

Please replace the paragraph at page 10, line 25, through page 11, line 19, with the following text:

According to a first alternative form, the photocatalyic coating is deposited, in the liquid phase, on the production line itself for the fibrous material. The advantage to this alternative form lies in the fact that the still semi-finished fibrous material can be treated an the best use can be made of the temperature which it is at, for example, resulting in a saving in terms of time and of production cost. This, a first embodiment consists in "hot" depositing the coating between the fiberizing devices and the devices for receiving the fibres. The fiberizing devices can consist of glass centrifuging dishes, known as "internal centrifuging devices", such as ones disclosed, for example, in Patents EP-0,189,534 and EP-0,519,797, making it possible to fiberize mineral wool of glass type, or devices for fiberizing by so-called external centrifuging using a succession of centrifuging wheels, such as ones disclosed,

for example, in Patents EP-0,465,310 or EP-0,439,385, making it possible to obtain mineral wool of basalt rock type. It can also relate to devices for fiberizing by mechanical drawing, in order to obtain reinforcing glass strands, by air blowing or by steam blowing, according to processes well known to persons skilled in the art. Use is thus made of the fact that the fibres are still at a relatively high temperature by applying the coating, generally in solution/dispersion, in a solvent, for example an aqueous solvent, which evaporates on contact with or in the vicinity of the fibres. The heat can also make it possible to cure the component or components of the adhesion promoter, if they are of the resin type, or to decompose them thermally, if they are of the silicon-comprising precursor or metallic precursor type mentioned above.

Please replace the paragraph at page 12, lines 6-18, with the following text:

As mentioned above, it is therefore possible to deposit the photocatalytic coating just under the bushing, in particular concomitantly with the deposition of the size, in which it can be incorporated. It is also possible to deposit it during the stage of finishing the spooled strands into finished products: it can, for example, relate to the conversion operation targeted at manufacturing mats of chopped strands, in a subsequent operation; it is also possible to deposit it on the downstream line, in particular during the conversion of the continuous strands, gathered together as a blanket, into a mat of continuous strands.

Please replace three paragraphs at page 13, lines 18-39, with the following text:

Another subject-matter of the invention relates to the application of these treated substrates to thermal/sound insulation or facing materials, with a dirt-repellent, fungicidal, antibacterial or odour-controlling function, or to liquid or gas filters of paper type or of felt or

mould type.

Other advantageous details and characteristics of the invention become apparent from the non-limiting embodiments described below in reference to the following figures:

Figure 1 shows a scanning electron microscopy (SEM) photograph of the surface of a fibrous material treated according to an embodiment of the invention;

Figure 2 is another SEM photograph showing the surface of the fibrous material shown in Figure 1; and

Figure 3 is yet another SEM photograph showing the surface of the fibrous material shown in Figure 1.

B11 Cont

All the following examples relate to the deposition of a coating for which the photocatalytic "active" components are made of anatase crystallized $TiO_2$. As mentioned above, the invention applies in the same way to semi-conducting "active" components with photocatalytic properties similar to anatase $TiO_2$ and which can be provided in the same form, in particular zinc oxide, tin oxide and tungsten oxide.

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Please replace four paragraphs at page 14, line 8, through page 15, line 22, with the following text:

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This solution containing particles of $TiO_2$ crystallized in anatase form, probably composed of crystallite agglomerates, these agglomerates having a mean size of the order of 20 to 80 nm. These particles are therefore the "active" components in terms of photocatalysis. The solution also contains an organometallic $TiO_2$ precursor which will decompose into predominantly amorphous $TiO_2$ by heat treatment and which will act as adhesion promoter.

B12

The coating obtained was baked at 200°C for 2 hours and contains anatase

nanocrystals in an amorphous $TiO_2$ matrix. The yellow colour of the filter thus manufactured testifies to the presence of organic compounds originating from the precursor solution. After exposure to ultraviolet A radiation under a dose of 4 $W/m^2$ for 2 hours, the yellow colour has completely disappeared, which shows complete decomposition of the residual organic pollutants.

**EXAMPLE 2**

Glass fibre of insulation type obtained by binder-free internal centrifuging was converted by the papermaking route in pure water. The paper obtained, circular with a diameter of 100 mm and a weight per unit area of 150 $g/m^2$, was subsequently impregnated over its entire thickness by dip-coating it in an alcoholic dispersion containing, by volume, 5% water, 1% tetraethoxysilane (the adhesion promoter) and 1% anatase crystallized $TiO_2$ particles with a mean diameter of 30 nm (the "active" components). The paper was dried in the open air and then baked in an oven at 450°C for 30 minutes. This filter was subsequently placed over an inlet orifice of a fume cupboard. A control filter, without anatase $TiO_2$, was placed over the neighbouring orifice. An ultraviolet A lamp shines on these filters at a dose of 4 $W/m^2$. After the cupboard had been operated for 15 days, the treated filter was still white, whereas the untreated filter was fouled.

**EXAMPLE 3**

A composition for the sizing of glass wool of insulation type obtained by internal centrifuging was manufactured by mixing:

55 G of resin obtained by condensation of phenol and formaldehyde in an initial formaldehyde/phenol molar ratio of approximately 3.2/1, which condensation is carried out conventionally with a catalyst in the form of sodium hydroxide at 5.5% by weight with respect to the phenol,

45 g of urea,

3 g of aminopropyltrimethoxysilane,

0.3 g of ammonium sulphate,

6 g of 30% by volume aqueous ammonia,

B12 Cont

1200 g of a 25% by weight dispersion in water of anatase crystallized $TiO_2$ particles,

and

34 litres of water.

Please replace the paragraph at page 17, lines 11-17, with the following text:

B13 Examples 3 and 4 illustrate an in-line hot deposition under the fiberizing devices, which will make possible treatment within the thickness of the fibrous material, with "precrystallized" $TiO_2$ particles and adhesion promoters of the family of the silanes in combination with the components of a standard size, in the aqueous phase.

Please change the page numbers after page 17 to subsequent consecutive numbers starting with 18.

Please replace the paragraph at page 18, lines 16-19, with the following text:

B14 An 80 g/m$^2$ glass web was impregnated with an aqueous solution containing 3.1% of Glymo (glycidoxypropyltrimethoxysilane) and 2.9% of titanium dioxide nanoparticles at a rate of 0.2 m/min.

Please replace the paragraph at page 19, lines 16-20, with the following text:

B15 According to the same process, a 60 g/m$^2$ glass web was impregnated in an aqueous